

Appendix D – Transportation Effects on Property Values

D1 - TRANSPORTATION EFFECTS ON PROPERTY VALUES

In California, studies of highway effects on residential land and property values date back to at least 1947. Since then, at periodic intervals, the transportation planning community both inside and outside California has revisited the topic. More recently, transit's effect on property values has also been explored. This brief discussion, broken into three main parts, looks at the effects of both freeways and transit on residential property values. It is not meant to provide definitive information but rather serve as background information to help environmental planners understand such issues. The various questions generally revolve around a single basic question: Does the residential neighborhood where a new transportation facility is being proposed suffer economic damage? If yes, then to what extent? A drastic downward shift in property values could also mean, of course, that the local tax base may suffer.

Beginning in 1990, as part of the environmental studies for a major new construction project, Caltrans District 6 sponsored a two-stepped research project on the effects of freeway construction on residential property values. The first step was to have a literature review conducted on the topic by Mara Feeney and Associates, a socioeconomic consulting firm from San Francisco. After the literature search had been completed, Vernazza Wolfe Associates, an economic consulting firm based in Oakland, and Spear Street Advisors, a San Francisco planning firm, jointly performed a detailed analysis of State Route 41 in Fresno. The purpose was to determine the effects of a new freeway on existing single family residential home prices. This appendix summarizes 1) the literature review and 2) the case study on State Route 41 prepared under contract to Caltrans. These studies only related to highways and freeways; however, the final part 3) briefly discusses how transit affects property values.

D2 - LITERATURE REVIEW

The studies surveyed focused on the effects of new, limited-access freeways on property values in nearby residential communities. Areas near interchanges were excluded from most of the studies reviewed in order to avoid skewing the findings because land values in interchange areas frequently soar relative to non-interchange areas (Gamble, et. al. 1974).

Except for two annotated bibliographies, all of the material surveyed consisted of studies researching the socioeconomic impacts of freeway projects. More than a dozen articles detailing the results of more than 20 different studies were reviewed. Two of the studies were conducted by private research firms for state transportation departments, six were research papers presented to the Transportation Research Board, and several others were sponsored by FHWA. Seven of the studies were published between 1971 and 1978; the remaining five were published between 1981 and 1987.

Study Methodologies

The twelve studies reviewed employed a variety of methodologies, with a few using more than one. The method most commonly used was the "comparison control" method in which an impact area adjacent or close to a freeway is compared to a control area further removed from the

freeway. In studies of this type, sales transaction data for the two different areas are analyzed for a particular time period. The control area is as similar to the impact zone as possible in its demographic and physical characteristics. The advantage of this method is that the two areas are compared over an identical time period, and any variables other than the freeway will presumably be acting on both areas simultaneously. It can be very difficult, however, to ensure that the two zones are identical except for their proximity to the freeway. Other hidden variables may be acting differentially in the two different areas.

Another research method for determining a freeway's effect on property values involves analyzing residential sales transaction data for a particular community before, during, and after construction of a nearby freeway. This "before and after" method was used far less often than the comparison control method in the studies reviewed for this research. Only two of the studies reviewed used this method: Burkhardt (1971) and Allen (1981). In Burkhardt's study, the before and after methodology was used in conjunction with the comparison control methodology.

The advantage of the before and after method is that it allows researchers to examine the changes in property values throughout the entire freeway construction period. Residential property values are tracked from the period before plans for a freeway are common knowledge until the facility has been operational for several years. For this type of study, the pattern of change as well as the final outcome can be observed. One criticism that has been made about the before and after method is that it may incorrectly attribute any increase or decrease in value to the freeway. Other unrelated variables such as regional growth may be acting on the area during this time, and may be very difficult to factor out (Gamble, et. al. 1978).

A few other methods, such as the "case history" method and the "interview and public opinion survey" approach, were also used in the studies surveyed. The case history method, which Burkhardt employs in conjunction with other methods, involves reconstructing trends in property values for different communities near freeways and comparing the different outcomes. For the interview and public survey approach, researchers generally interview property owners to see how property values have been affected by the freeway and to assess owners' attitudes towards the freeway. In Palmquist's study, property owners were interviewed about their perceptions of the adverse and beneficial effects of having a major highway located nearby. These perceptions were then compared with the effects revealed through research on the local real estate market.

Study Findings

Despite the fact that considerable research has been done over the past 30 years to determine the effect of highways on residential property values, there is no consensus on the answer. The difficulty in assessing the precise effect of freeways on property values can be attributed in large part to the fact that property values are a function of so many different variables. These can include nearby land uses, community services such as sewer and water, land use controls, topography, natural amenities, regional growth or decline, prevailing mortgage interest rates, availability of capital funds, and supply and demand in the local real estate market. With all of these variables entering into the equation, separating the effect of the freeway alone, while keeping all of the other variables constant, is an extremely difficult, if not impossible, task. Because each community/freeway interface is influenced by so many different factors and

because the interface varies from case to case, most of the study authors warn that their findings may not be applicable to other situations.

While there was no clear consensus on the question of freeway effects on residential property values in the studies reviewed, a few patterns emerged that warrant discussion. Most of the studies divided the area being analyzed into three distinct zones—one area in which houses abut the freeway right-of-way or are within a block or two of it, a second area in which houses are approximately two to eight blocks from the freeway right-of-way, and a third (control) area that is removed completely from the freeway and studied only for comparison purposes. For the purpose of this discussion, we refer to these three zones as the "abutting", "secondary impact", and "control" zones, respectively. Most of the studies reviewed found that freeway effects on property values differed in the abutting zone and the secondary impact zone.

Effects on Property Values--Abutting Zone

A majority of the studies surveyed found that price appreciation for properties abutting the freeway, or within approximately 500 feet (about 150 meters) of it, lagged behind that of properties in either the secondary impact or control zone. Researchers attributed this slower rate of appreciation primarily to adverse environmental effects such as noise and air pollution from the freeway. The amount of the lag in appreciation due to proximity to the freeway, however, varied from study to study. One study conducted in Northern Virginia from 1962 to 1978 found that properties within 1,125 feet of the freeway appreciated by approximately \$3,000-\$3,500 (in 1978 dollars) less than equivalent properties farther from the freeway, which represented approximately a 5% lag in appreciation (Langley 1981). In another study, researchers found that noise was a significant factor in explaining residential price variation. Data were gathered on all valid property sales between 1969 and 1971 for four residential areas in the eastern U.S. Researchers found that, due to noise pollution, prices for properties abutting the freeway were \$2,050 (or 6.6%) lower than the average price of all properties in the four study areas (Gamble, et. al., 1974).

Two articles reviewed for this research included literature surveys of various studies done on the socioeconomic effects of freeways. The findings of the studies reported in these surveys generally support the findings of the research discussed above. One survey reported that the decrease in property values for houses abutting a freeway ranged from 0.5% in one study (U.S. Department of Transportation 1976) to 16% in another (Gamble, et. al. 1974). In the Gamble survey, the majority of the studies indicated that properties abutting the freeway experienced some loss in value relative to properties farther from the highway.

Of the studies surveyed for this report, only one found no discernible negative effect on property values for homes abutting the freeway being studied. In this study, conducted in the Phoenix, Arizona area, analysis was performed on residential property sales transaction data for sales occurring between 1972 and 1987. The researchers qualified their findings, somewhat, with the reminder that the freeway in question was very well integrated into the adjacent community. The freeway had a beneficial design and adequate rights-of-way. In addition, parks and other amenities were designed around the freeway to preserve the single family residential character of the adjacent neighborhood (Mountain West Research, Inc. 1987).

While the majority of the studies surveyed found some lag in appreciation for properties abutting the freeway, two studies found strong evidence that potential loss in property values is frequently offset by appreciation resulting from the increased accessibility of the area. In those studies where the issue of gain due to increased accessibility was addressed, researchers found there was a net *gain* in abutters' property values relative to properties in the control zone. Study authors attributed this increase in appreciation to the increased desirability of a neighborhood with improved access.

One study examining the issue of appreciation due to increased accessibility was done in the State of Washington for five different study areas. Researchers found that the improved access to residential areas provided by highway construction resulted in property appreciation rates 15% to 17% greater than those of comparable properties lacking such access advantage. Even with properties in close proximity to the freeway, where noise level readings were highest, accessibility-induced property appreciation more than offset noise-induced depreciation, which ranged from 0 to 7.2%. Thus, in this study where both the adverse and positive effects of the freeway could be quantified, the net effect was a gain in value for properties abutting the freeway (Palmquist 1981).

In the second study (Gamble et al. 1974), four residential communities bisected by interstate highways were examined to determine both the effect of regional accessibility and of highway-related disturbances on property values. Data were gathered for all valid property sales from 1969-71. Due to the difficulty and complexity of assessing property value benefits from regional accessibility, only one of the four study communities was analyzed for this type of gain. The results showed that the increase in value for properties in the Impact Zone (composed, in this study, of the abutting and the secondary impact zone) was \$2,950 or almost 9% of the value of the average property. The highway-related adverse environmental effects on abutting properties reduced property values by an average of \$1,518, or almost 4.5%. Thus, abutting properties appreciated 4.5% more than comparable properties in the control zone, but 4.5% less than properties in the secondary impact zone. Researchers determined that the highway-induced benefits that property owners realized in the community as a whole totaled approximately \$5 million, compared to highway-related property value losses of \$303,000. Thus, the freeway was believed to have produced a net gain of approximately \$4.7 million in property values overall, although these were not evenly distributed.

In summary, when reviewing the losses that property owners with homes abutting the freeway suffer, it is important to bear in mind that these losses are only part of the total picture. As Gamble et. al. explain in their study, "The estimates of highway environmental effects on property values are really gross cost figures. To provide a more balanced and realistic view of the effects of a major highway on property values in a residential community, the influence of improved accessibility must also be considered" (1974).

Effects on Property Values- Secondary Zone

For properties in the secondary impact zone, typically 2 to 8 blocks from the freeway right-of-way, most of the studies reported no loss due to adverse environmental effects, and a gain due to increased accessibility for the area. Non-abutting properties in the impact zone also tended to appreciate faster than comparable properties in the control zone, in those cases where the freeway had improved the accessibility of the area. Palmquist's and Gamble's (et. al.) studies

indicated that properties in the secondary impact zone appreciated 9% to 17% compared to comparable properties in the control zone. In the Palmquist study, however, significant appreciation occurred only in those communities where the increase in accessibility was substantial. He found that in the one study area where the freeway was not used by commuters or shoppers, property values did not appreciate significantly.

One study somewhat contradicted the findings done by Palmquist and Gamble, et al. In a study of the Washington Beltway area, which analyzed property transaction data for the years 1962-1978, the researcher found that properties in *both* the abutting and secondary impact zones depreciated by \$3,000-\$3,500 relative to properties in the control zone (Langley 1981). It is, unfortunately, beyond the scope of this review to attempt to reconcile the different findings of the various studies surveyed.

Factors Influencing Effects on Residences

Studies reviewed for this research indicate that certain design factors can influence the direction and magnitude of freeway effects on property values in the adjacent community. These factors are described briefly below.

1. Physical Design

Freeways may be built as either depressed, at-grade, or elevated roads. The choice in design has been observed to affect both the size of the impact zone and the magnitude of the effect that the freeway may have. One study observed that in the case of depressed freeways, effects of the roadway did not seem to penetrate beyond the second block. For surface and elevated highways it was generally necessary to study effects as far as the fourth or fifth block from a roadway. (Burkhardt 1971). This same study found that surface and depressed highways depress land values by 5%.

2. Location/Integration of Freeway Alignment

One study observed that freeway alignments coinciding with pre-existing neighborhood boundaries were substantially less disruptive than rights-of-way through established neighborhoods (Burkhardt 1983). In addition, in the Arizona study previously mentioned where the freeway was not found to adversely affect property values, the road was a depressed design with pedestrian walkways connecting the community to parks on the other side of the freeway. The authors attributed the minimal impact of the freeway, in large part, to how well-integrated it was with the community (Mountain West Research, Inc., 1987). Another study asserted that parks along a freeway seem to equalize the land value differential between properties close to the freeway and those farther away (Burkhardt 1971).

3. Noise Impact

Noise is the adverse highway effect mentioned most often when residents near freeways are questioned about freeway environmental effects. Objectionable noise is generally considered to be in the 50 to 90 decibel (dBA) range (U.S. Department of Transportation 1976). Sound in this range will not cause physical harm, such as hearing loss, but may cause lack of sleep or interrupt normal speech.

A relatively consistent finding in the literature surveyed is that adverse property value impacts due to noise are caused only when noise exceeds a certain threshold level. One researcher estimated that this threshold level was 10 dBA above the ambient noise level in a given residential area (Gamble, et. al. 1974). Another study found that once the noise level exceeded 70-73 dBA it strongly correlated to lower housing prices (Hall et. al. 1978). In summary, while researchers did not agree on the exact threshold level or the dollar value per decibel of noise, most of the studies did find a strong correlation between noise levels (generally above 70 dBA) and depreciation (or slower appreciation) in housing prices.

4. Accessibility

In both studies that examined the effect of increased accessibility on property values, researchers found that the gain in accessibility was reflected in housing prices. Palmquist's study found, in addition, that the magnitude of the gain depended on the magnitude of the increase in accessibility. Where the freeway was used on a daily basis by community residents for commuting, shopping, etc., housing prices increased substantially. In the case where the freeway was not used for these purposes, especially with regard to work trips, the gains were not significant. Where improvement in accessibility was substantial, property values increased by 12% or more relative to properties without such access opportunities (Palmquist 1981).

Conclusions

Because the studies reviewed present conflicting findings about the effects of freeway construction on residential property values, they do not provide a reliable basis upon which to predict the property value effects of future freeway construction. Most researchers concluded their studies by saying that additional research is needed on this topic, and they cautioned against generalizing from their findings in a particular case study to other freeway construction situations.

In spite of the absence of a reliable predictive model, the majority of the studies point to recurring patterns in the effect of freeways on residential property values. Most studies recognize that freeway construction can produce conflicting influences on property values. On the one hand, adverse environmental effects, especially noise, can adversely affect property value appreciation, while the improved access provided by the freeway can positively influence property values. Most studies documented a strong "distance-decay" relationship for freeway effects on adjacent neighborhoods. That is, adverse environmental effects associated with the freeway decrease rapidly as one moves away from the freeway alignment.

From the studies reviewed, it appears that properties abutting the freeway or in very close proximity to it (generally within a block or two) appear to suffer most of the adverse effects from the freeway. While a majority of the studies found that these abutting properties do not appreciate as rapidly as other properties, several studies determined that there is a net gain in value in the general vicinity of the freeway due to increased accessibility. In those studies where the adverse and beneficial effects of freeways were quantified, houses in both the abutting and the secondary impact zone appreciated more than comparable properties in the control zone. One study, however, did show a loss in value for all properties in the impact zone relative to the control zone. Variables such as freeway design, location, and integration into the community appear to influence the direction and magnitude of highway effects on property values.

References

- Allen, Gary R. *Highway Noise, Noise Mitigation, and Residential Property Values*. Charlottesville, Virginia: Virginia Highway and Transportation Research Council, 1981.
- Burkhardt, Jon E. "Community Reactions to Anticipated Highways: Fears and Actual Effects." *Highway Research Record*, No. 470, 1973, pp. 22-31.
- Burkhardt, Jon E. "Socioeconomic Reactions to Highway Development," August 10, 1983. (Paper prepared for presentation to the 63rd Annual Meeting of the Transportation Research Board.
- Burkhardt, Jon E., Armando L. Lago and Jerome Rothenberg. *Highway Improvement as a Factor in Neighborhood Change*. Bethesda, Maryland: Resource Management Corporation, 1971.
- Gamble, Hays B., Owen H. Sauerlender and C. John Langley. "Adverse and Beneficial Effects of Highways on Residential Property Values." *Transportation Research Record*, No. 508, 1974, pp. 37-48.
- Gamble, Hays B., et. al. *The Influence of Highway Environmental Effects on Residential property Values*. University Park, Pennsylvania: Institute for Research on Land and Water Resources. 1974.
- Hall, Fred L., Barbara E. Breston and S. Martin Taylor. "Effects of Highway Noise on Residential Property Values." *Transportation Research Record*, No. 686, 1978, pp. 38-43.
- Hsu, Ann Yi-rong and James O. Wheeler. *A Bibliography of Highway Impact Studies, 1966-1976*. Council of Planning Librarians Exchange Bibliography, No. 1401, 1977.
- Langley, John C. *Highways and Property Values: The Washington Beltway Revisited*. Knoxville, Tenn: Department of Marketing and Transportation, The University of Tennessee, 1981.
- Mountain West Research, Inc. *Socioeconomic and Land Value Impact of Urban Freeways in Arizona*. Phoenix, Arizona. October 1987.
- Onibokum, Adepoju G. *Socioeconomic Impact of Highways and Commuter Rail Systems on Land Use and Activity Patterns- An Annotated Bibliography*. Council of Planning Librarians Exchange Bibliography No. 815, 1975.
- Palmquist, Raymond B. *The Impact of Highway Improvements on Property Values in Washington State*. Olympia, Washington; Washington State Department of Transportation, 1981.
- Sale, James and Elenor Steinberg. "Effects on Nonrelocated Households of Building a Highway in a Dense Urban Residential Area." *Highway Research Record*. No. 356, 1971, p. 173.
- U.S. Department of Transportation. *Social and Economic Effects of Highways*. Washington, D.C. 1976.

D3 - ROUTE 41 EFFECTS ON HOUSING PRICES

Methodology

Researchers from Vernazza Wolfe Associates, Inc., and Spear Street Advisors, Inc., analyzed all sales transactions of single family detached homes in four census tracts in Fresno in the years between 1981 and 1990. The sales information, obtained from a computerized information service that collects data directly from the County Assessor's Office, was supplemented with information on detailed location characteristics. A comparison-control method was used: housing transactions in three "impact" or freeway areas were compared to transactions in an adjacent control area.

Two principal types of analyses were conducted. The first was an analysis of prices (using multiple regression) to determine the relative importance of 14 independent variables on sales price (constant dollars). These variables included housing and block characteristics, as well as factors such as distance from the freeway, visibility of the facility, and noise. In the full model, the freeway factors were not as significant as housing characteristics, such as square feet of improvements or lot area. Of the freeway variables, visibility was the most important. The variables included in the full model explained approximately 66% of the variation in sales prices of houses that sold between 1981 and 1990.

The second type of analysis performed was an examination of house price appreciation over the same time span (1981-1990). Two types of appreciation were defined and studied. This analysis examined the difference in sales prices by map area on an annual basis. There was no discernible freeway effect on price appreciation when comparing the rates of appreciation of the impact areas with the control area. This finding also applied when appreciation rates at various distances from SR 41 were compared.

Findings

Based upon the research and both regression and price appreciation analysis performed, the consultants concluded that the presence of SR 41 did not substantially affect sales prices in residential areas adjacent to the facility. The study concluded that it is the visibility of the freeway that may influence selling price and not distance or noise. As a result, the researchers generally concluded that the more the visibility of a new freeway is reduced, the less it would determine the sales price of homes sold in the area.

The preceding Part B was adapted from: Marian Wolfe, "Housing Price Impacts on Route 41." *California Planner*. October 1992, p. 5.

D4 - TRANSIT AFFECTS ON PROPERTY VALUES

The following is a summary of a study conducted by the Joint Center for Marketing Research at Rice University in Houston, Texas. The Joint Center has since dissolved. This summary was published in the Transportation Research Board's *Newsline* (Volume 16, Number 4, October 1990).

Transit, particularly fixed-facility transit, significantly affects property values in the areas it serves. Because transit costs are borne by a combination of users, taxpayers, and landowners in the area of the transit system, the beneficiaries may be required to return a portion of the value they receive from the transit service through special taxes, donations, or in other ways. So that the burden of costs may be shared as equitably as possible, the economic benefits received by each group should be better understood. The study, *Assessment of Changes in Property Values in Transit Areas*, was carried out to provide information on the benefits that accrued to property owners from the impact of transit on surrounding land values.

Transit can affect property values in several stages, such as route selection, site selection, clearance and displacement, construction, early operation, and mature operation. The value of the property may change by a considerable amount. Transit service may enhance the value of nearby properties because it provides greater accessibility and visibility; on the other hand, it may depress the value of surrounding areas because of noise, pollution, temporary disruption due to construction, permanent isolation of some properties, and other incidental effects.

The researchers admit that the impact of a transit station is due to factors so completely intertwined that it may be meaningless to consider them separately. The station is typically built in an area chosen for its high growth potential, and many stations are coupled with value enhancers, such as special zoning ordinances, to encourage nearby developments. Even if complete information were available on rents, occupancies, sales prices, and other relevant factors, it would still be impossible to trace changes in values to one particular factor.

The researchers reached certain conclusions on the basis of studies and interviews in nine U.S. and two Canadian cities. From a review of the literature, it appeared that the total increase in land value attributable solely to the introduction of rapid transit service may have been more than 100 percent of the total construction cost of the service. This appeared to be true for commercial and residential area near the Washington Metro system and for residential areas near the Lindenwold rapid transit line linking Philadelphia and its New Jersey suburbs. The public sector has taken only limited advantage of the increased land values to offset the capital and operating costs of the system; the main beneficiaries of the increase in property values have been the landowners near the stations.

Major rapid transit construction projects have significantly affected the location of new commercial development. Transit stations have been magnets for new development, particularly in the central business district (CBD). For example, in Toronto 90% of all new office construction has occurred around rapid transit stations, whereas in Washington D.C., 48% of all commercial and 36% of all new construction has taken place in station areas. Commercial and office rentals have usually increased with access or proximity to the transit station, and rent premiums of 10% are common. Researchers found that the value of commercial land could rise substantially by virtue of being near a transit station; increases in values of 100 to 300 percent were not uncommon. In fact, the Bay Area Rapid Transit studies found that the value of land near the stations (within about 100 ft) increased significantly even before the introduction of rail service; however, at the same time, property 1,000 feet away from the station site suffered a slight decline in value.

As might be expected, the value of CBD land near stations usually increased more than the value of suburban land near stations. Major rapid transit systems helped maintain the economic viability of downtown areas, which is important for cities trying to keep their downtowns strong. For example, retail activity in CBDs of large metropolitan areas with a new rapid transit system was usually healthier than that in CBDs without rapid transit.

The advent of rapid transit caused residential land values and rents to vary dramatically. Even within one metropolitan area, there were significant differences, and those differences certainly existed between metropolitan areas. Differences may also be related to the type of housing (single- or multi-family). Planned medium-to-high-density units close to stations tended to increase in value. The increase in land values was directly related to the degree of increased accessibility provided. This was especially true in congested areas. For example, new freeways greatly increased property values near metropolitan areas; interchange areas increased in value well over 1,000% depending on the location of the interchange.

Researchers found that the increase in development due to mass transit systems was not automatic. Strong market demand and hospitable planning, zoning, and taxing strategies were required before changes were likely. Highway access availability was another major factor affecting land values.

Incentives provided by the public sector could affect substantially the timing and intensity of private development around rapid transit stations. It was found that light rail systems had considerable potential for changing land uses if other pro-development forces were present. No positive impacts on land values, however, resulted from transit mall construction.

In the local surveys, significant changes in land value were found at stations combining transit access with zoning changes. Moreover, higher-class office centers tended to be developed, which forced less intensive land uses to locate elsewhere. The effect of rapid transit on land values became most pronounced when it was combined with density control changes.

There was general agreement that a project near a station would lease faster than a project located away from a station. Proximity to a rapid transit station was assessed to be a property amenity but not an explicit cause for a rent premium. If stations were located in high-growth areas, and if location decision was part of an overall land use planning program involving regulatory changes, the impacts on surrounding property could be substantial but difficult to attribute to any single cause. Transit system impacts may fall short of expectations.